

Examination Of The Heart

Charlie Goldberg, M.D.

Professor of Medicine, UCSD SOM

Cardiac Exam

- Includes Vital Signs & Pulmonary Exam
- **4 basic components** of cardiac, pulmonary and abdominal exams:
 - **Observation**
 - **Palpation**
 - **Percussion** (omitted in cardiac exam)
 - **Auscultation**

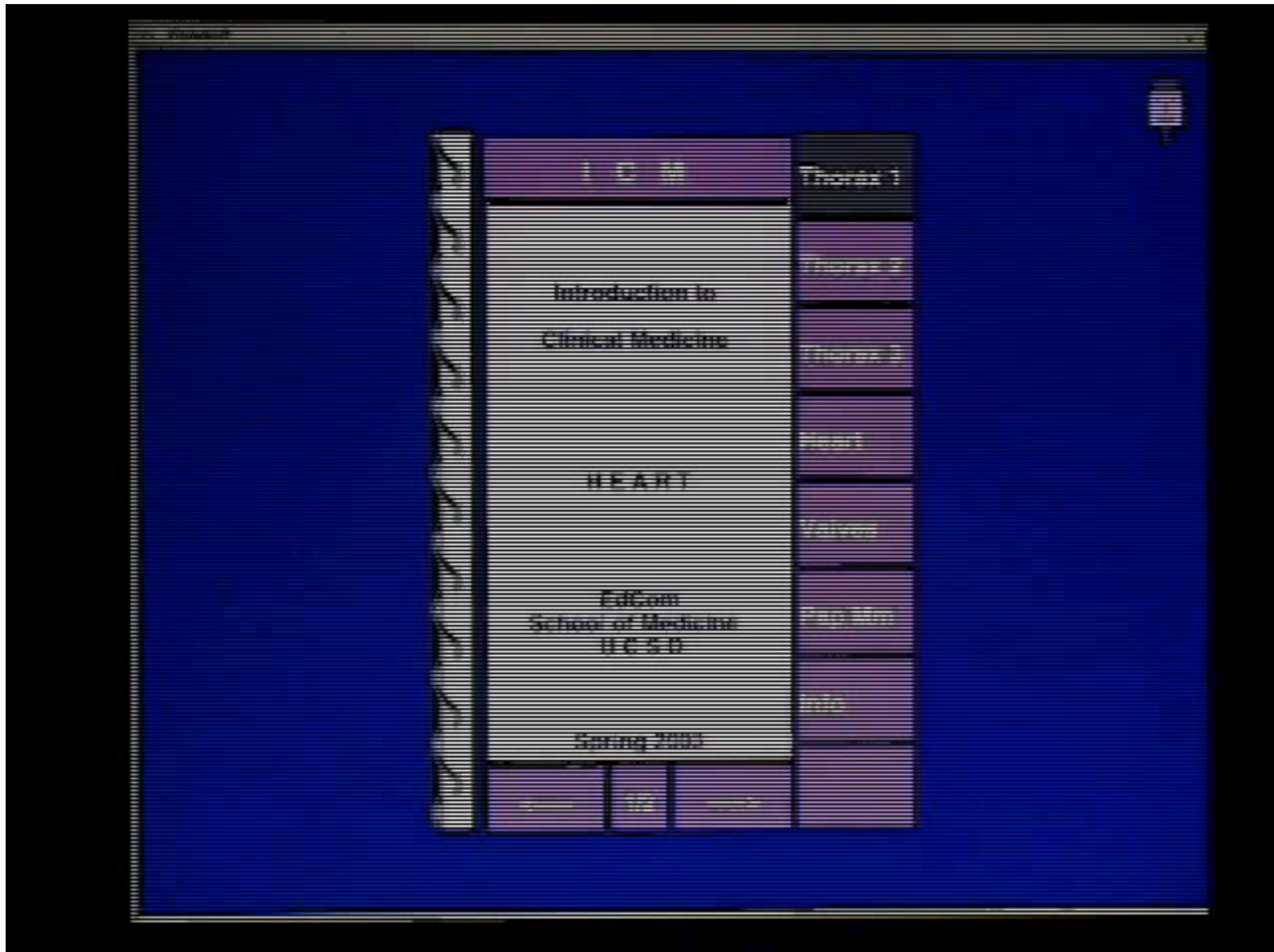


Observation

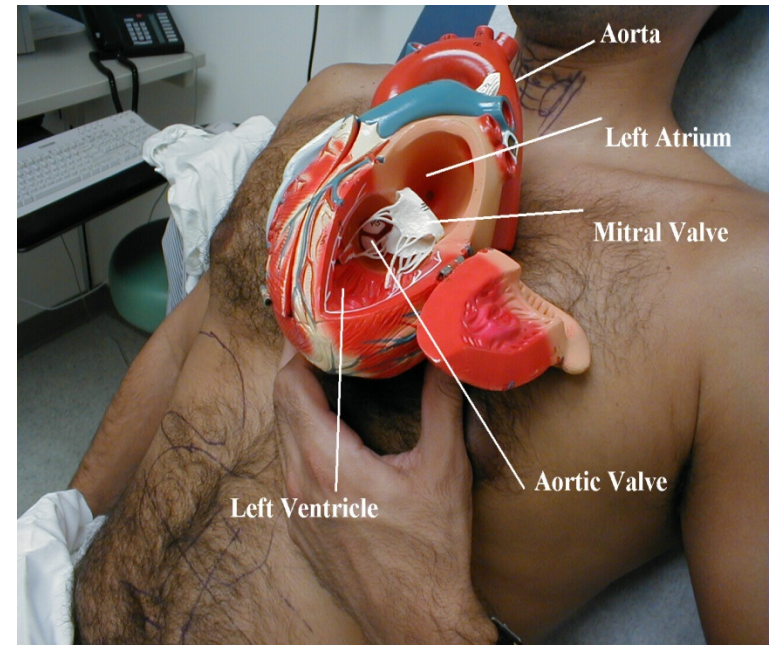
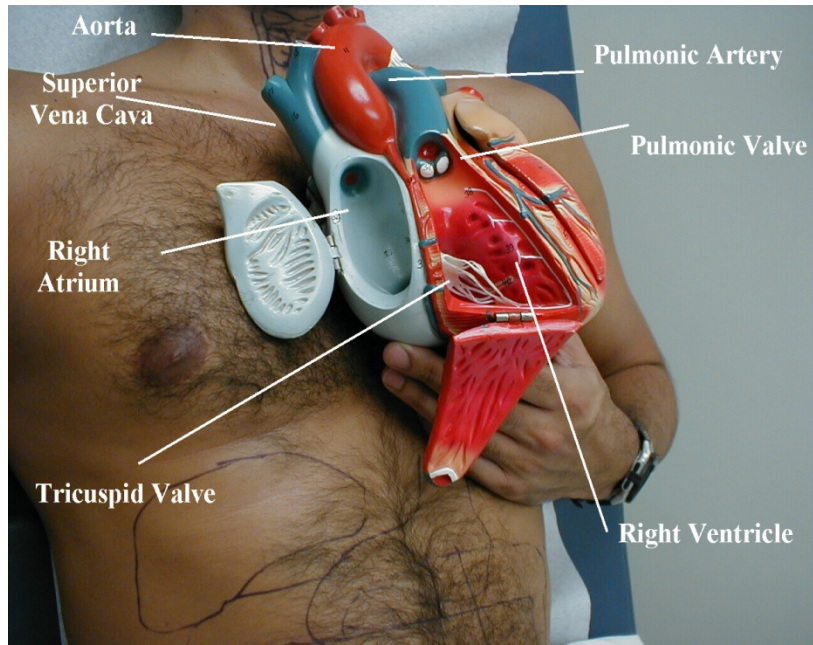
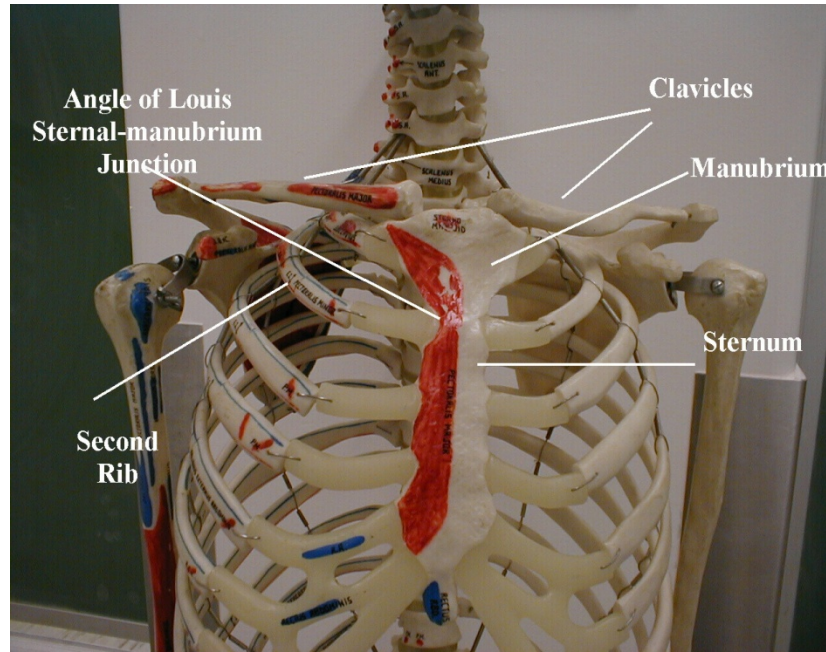
- Pay attention to many of same things as w/lung exam
 - **Chest** shape
 - Shortness of **breath** (@ **rest** or **walking**)?
 - **Sitting** upright? Able to **speak**?
 - ? Visible **impulse** on chest wall from vigorously contracting ventricle (**rare**)

Anatomy

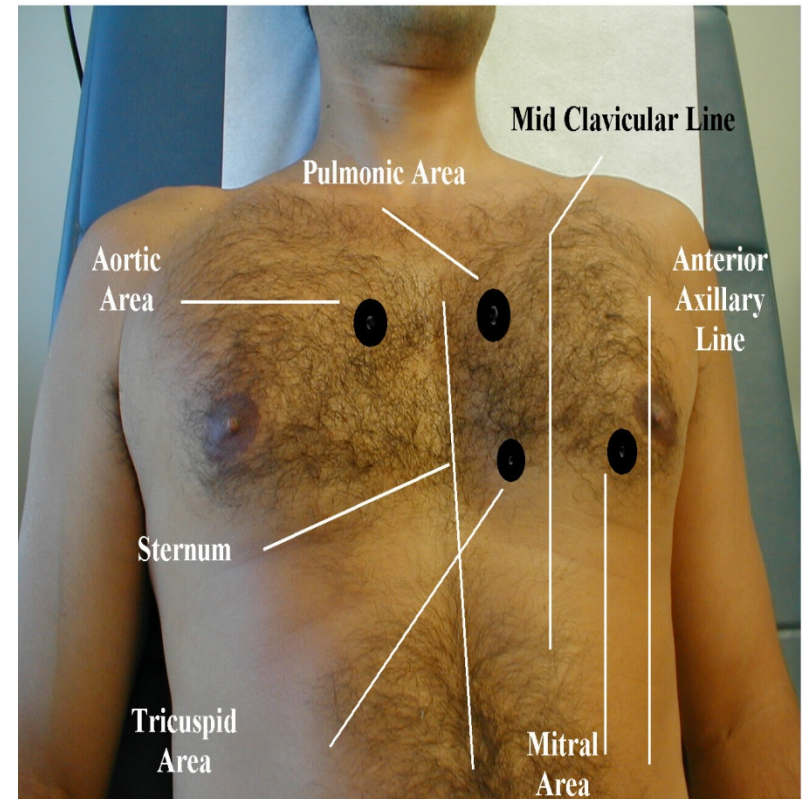
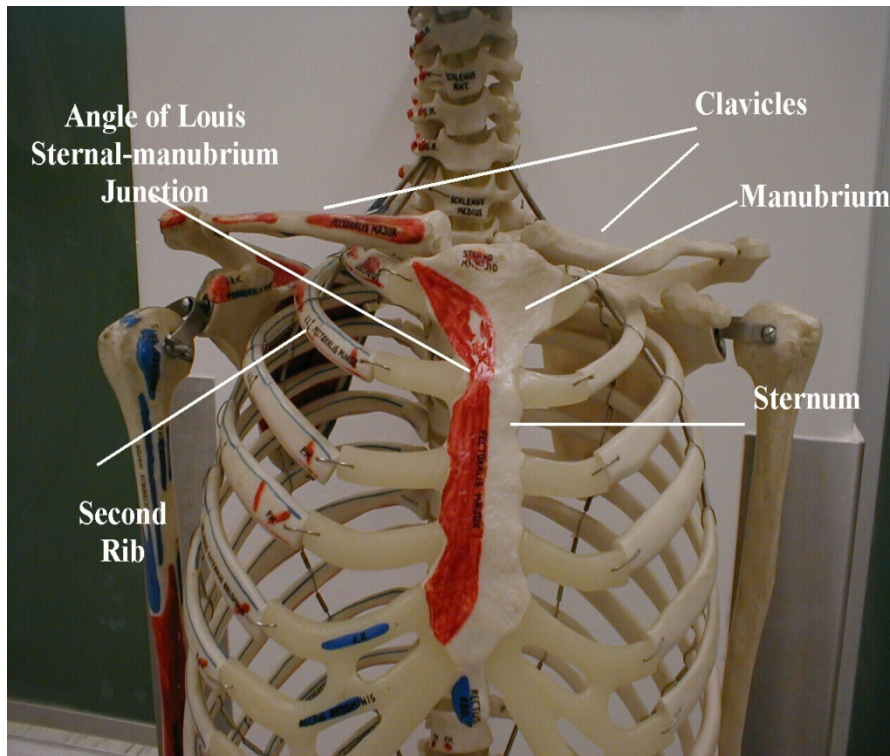
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Surface Anatomy



Valves And Surface Anatomy



- Areas of **auscultation** correlate w/rough **location** of ea **valve**
- Where you listen will determine what you hear!

[More Anatomy @ Blaufuss Medical](#)

Palpation

To assess:

- **Left Ventricle (LV):**
 - **Vigor of contractility** of underlying ventricle – if prominent, referred to as heave or lift
 - **Size** of LV
- **Right Ventricle:**
 - Vigor of contractility
- **Thrill** – rare **palpable sensation** associated w/regurgitant or stenotic murmurs (feels like sensation when kink garden hose)



Palpation - Technique



- **L ventricle** → **fingers** across **chest**, under breast (explain 1st to female pts!)
- Pay attention to/identify
 - **Point of Maximal Impulse (PMI)**
→ location apex ventricle – discrete area that pin-point w/finger tip ~70% of patients - if not palpable, repeat w/patient on L side
 - **Vigor** of contraction
 - Palpable **thrill** (rare)



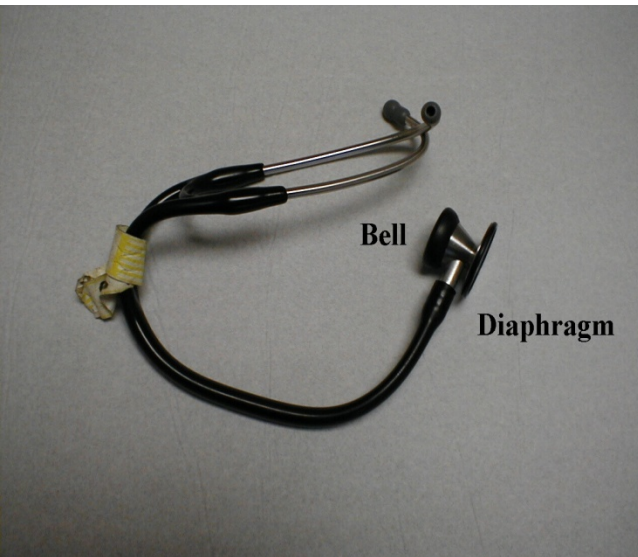
Palpation – Technique (cont)



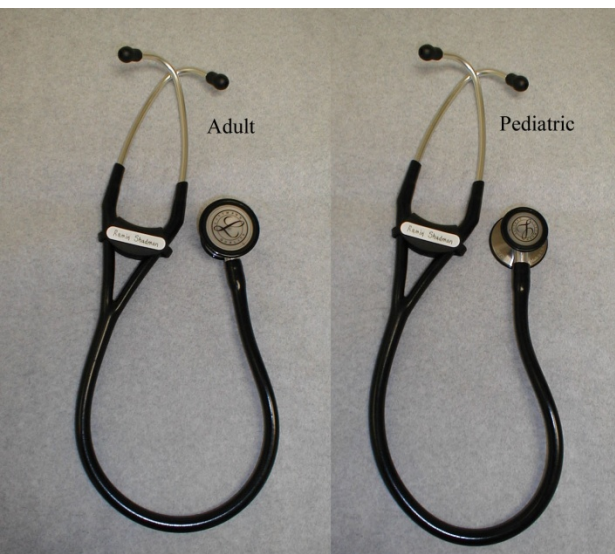
- **Right ventricle:**
 - Vigor of **contractility**
→ **heel of R hand**
along sternum



Auscultation: Using Your Stethoscope



They all work - most important part is what goes between the ear pieces!



Diaphragm → Higher pitched sounds

Bell → Lower pitched



What Are We Listening For?

- Normal valve closure creates **sound**
- **First Heart Sound = S1** → closure of **Mitral, Tricuspid** valves
- **Second Heart Sound = S2** → closure of **Pulmonic, Aortic** valves

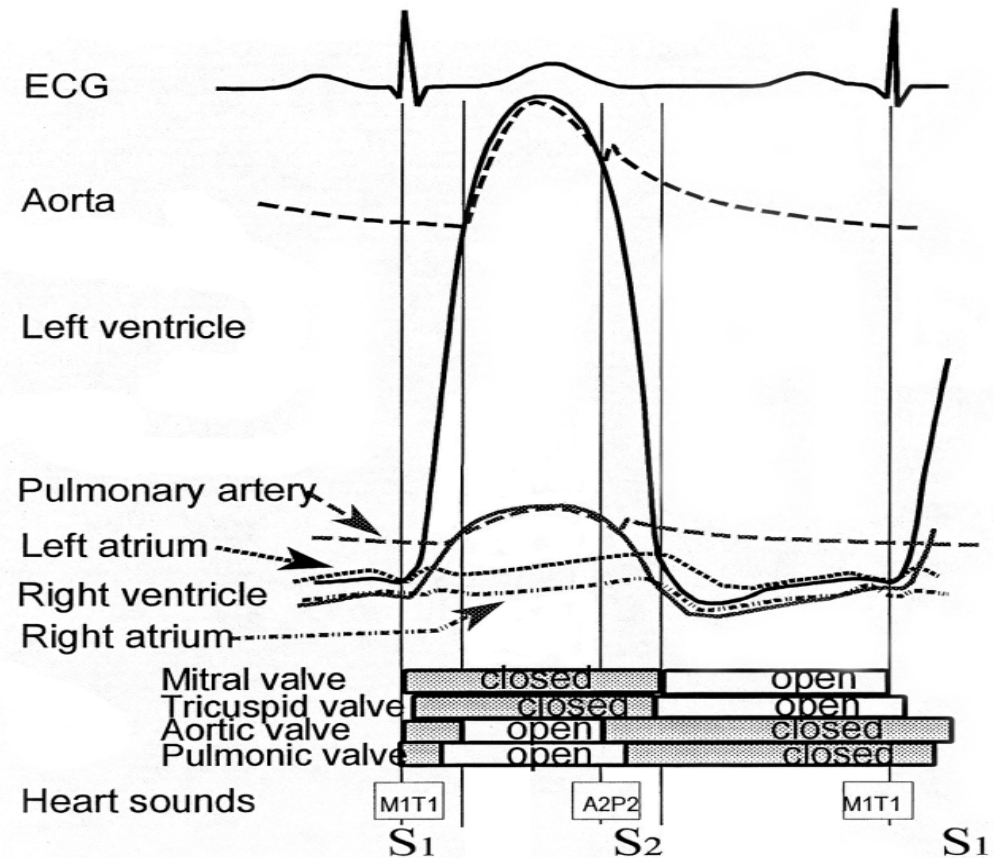
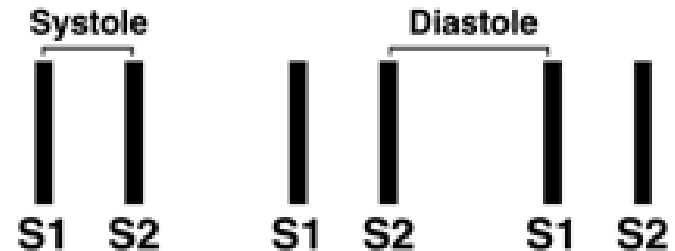


Figure 4: Cardiac cycle in left and right hearts

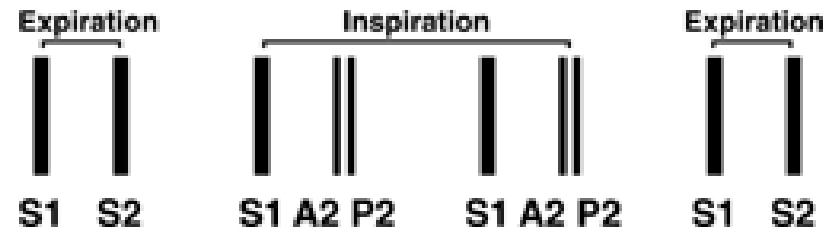
What Are We Listening For? (cont)

- **Systole** =s time **between S1 & S2**; **Diastole** =s time **between S2 & S1**
- Normally, **S1 & S2 = distinct** sounds
- **Physiologic splitting** =s 2 components of second heart sound (**Aortic & Pulmonic** valve closure) **audible w/inspiration**

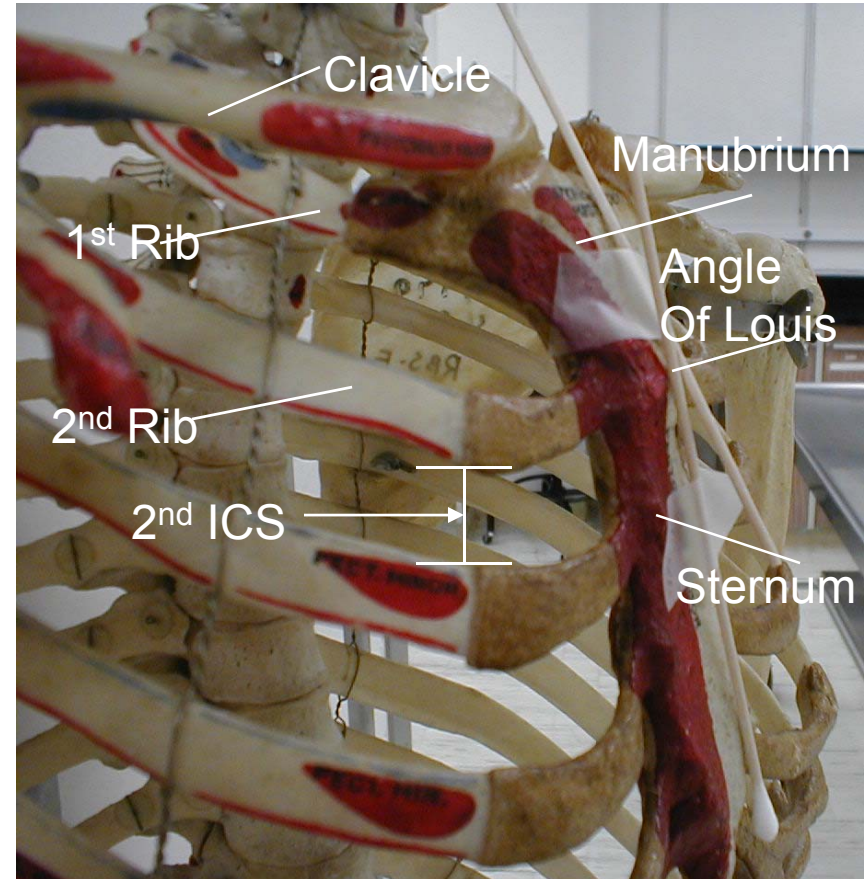
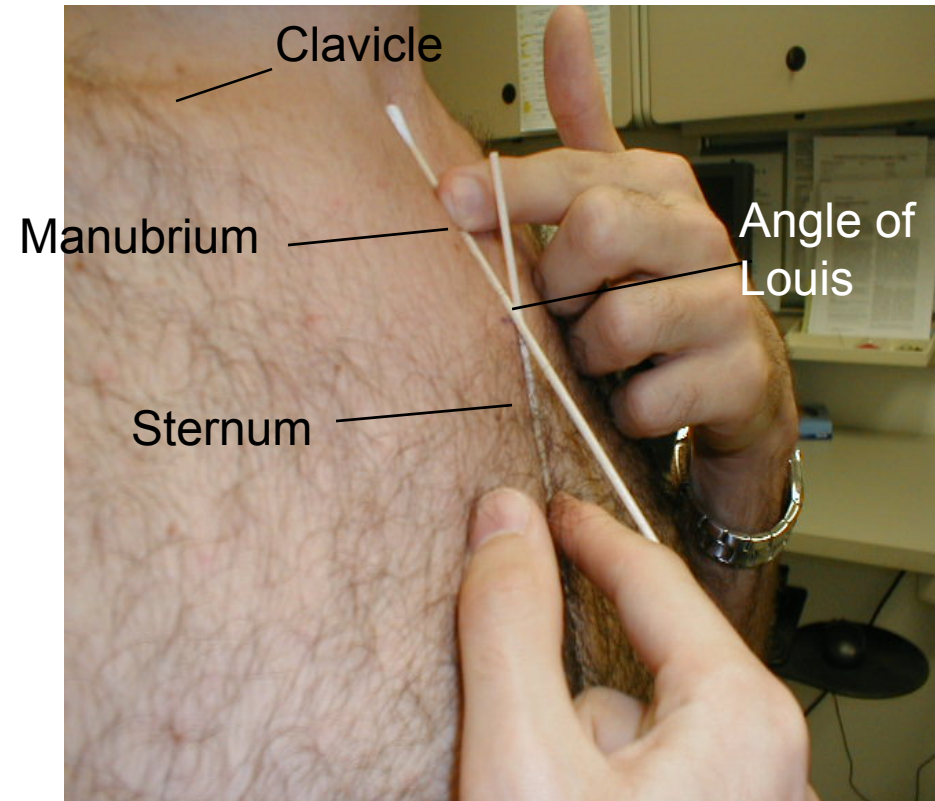
NORMAL CARDIAC CYCLE



PHYSIOLOGIC SPLITTING OF S2



Finding The Sternal Manubrial Angle (AKA Angle of Louis) – Key To Identifying Valve Areas



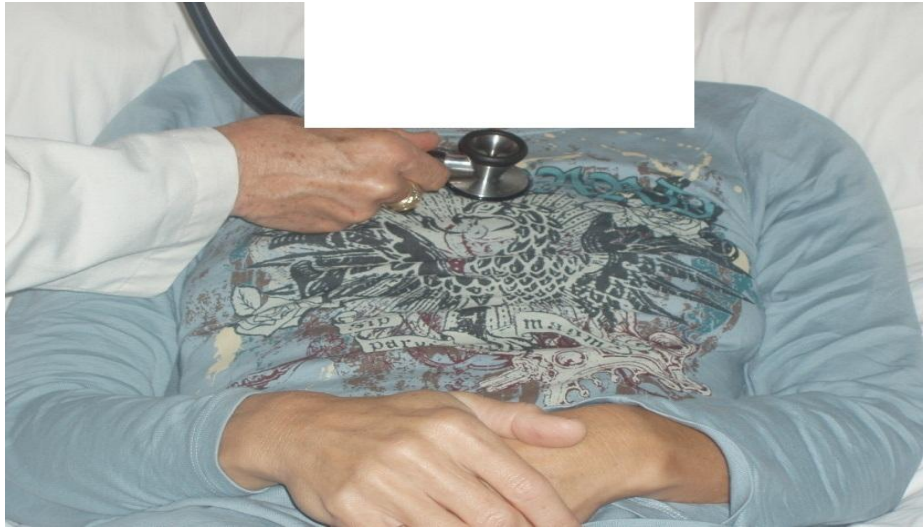
Manubrium slopes in one direction while **Sternum** angles in different direction. Highlighted by q-tips → intersection defines **Angle of Louis**.

Auscultation Technique



- Patient **lying @ 30-45** degree incline
- **Chest exposed** (male) or loosely fitted gown (female)
 - need to see area where placing stethoscope
 - stethoscope must contact skin
- Stethoscope w/**diaphragm** (higher pitched sounds) engaged

Remember – Don't Examine Thru Clothing!



NO!



Auscultation Technique (cont)

1. Start over **aortic area** → **2nd Right** Intercostal Space (**ICS**) – Use Angle of Louis as landmark
2. **Pulmonic** area (**2nd L ICS**)
3. Inch down sternal border → **tricuspid** area (**4th L ICS**)
4. Inch towards **mitral** area (**4th ICS, mid-clavicular**)

Listen in ~ **6 places** - precise total doesn't matter – simply gives you sense of change in sounds as change location

Auscultation



- In each area, ask yourself:
 - Do I hear **S1**? Do I hear **S2**?
Which is **louder** & what are relative **intensities**?
- **Interval between S1 & S2 (systole) is shorter** than between **S2 & S1 (diastole)**
- Can also determine **timing** by simultaneously **feeling pulse** (a **systolic** event)
- **Listen for physiologic splitting** of 2nd heart sound w/inspiration

Murmurs

- **Murmurs:** Sound created by **turbulent flow** across valves:
 - **Leakage (regurgitation)** when valve closed
 - **Obstruction (stenosis)** to flow when normally **open**
- **Systolic Murmurs:**
 - **Aortic stenosis, Mitral regurgitation** (Pulmonary stenosis, Tricuspid regurgitation)
- **Diastolic Murmurs:**
 - **Aortic regurgitation, Mitral stenosis** (Pulmonary regurgitation, Tricuspid stenosis)

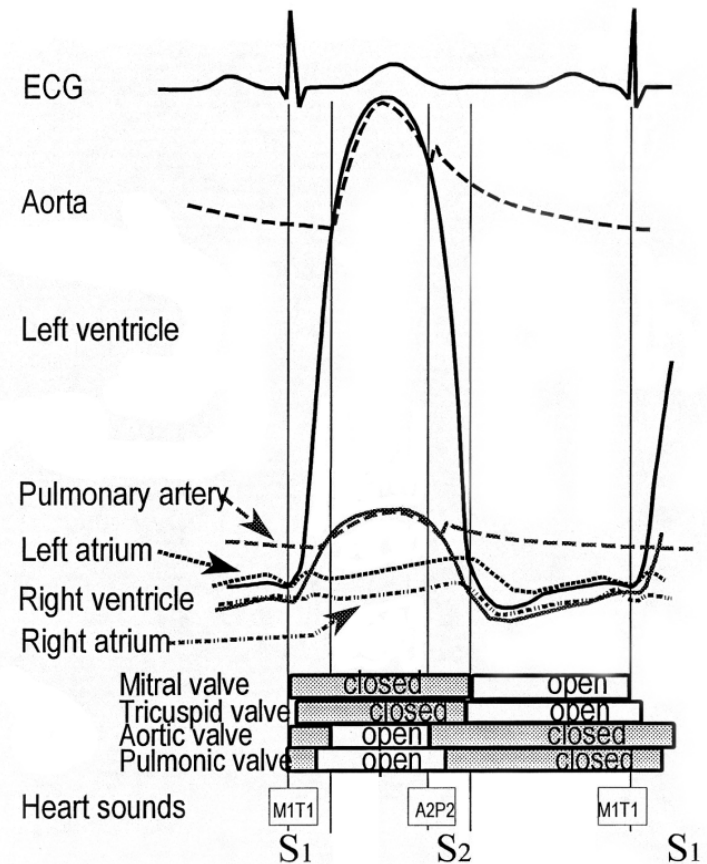
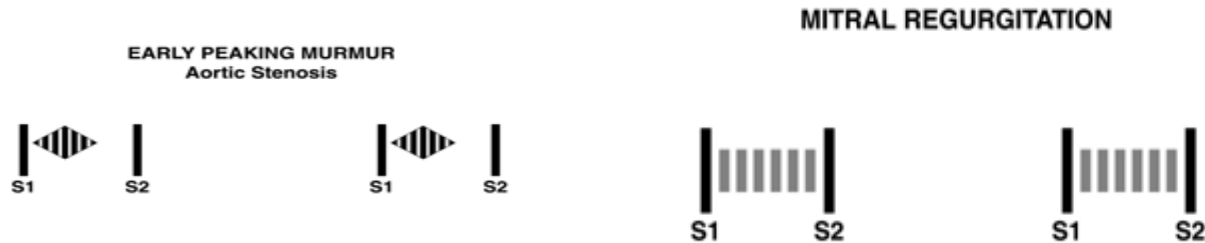


Figure 4: Cardiac cycle in left and right hearts

Image Courtesy Wilbur Lew, MD
UCSD SOM

Murmurs (cont)

- Characterized by: **position** in **cycle**, **quality**, **intensity**, **location**, **radiation**
– can try to draw it's shape:



- Intensity Scale:**
1 –barely audible **2**- readily audible **3**- even louder **4**- loud + thrill **5**- audible with only part of diaphragm on chest **6** – audible w/out stethoscope
- intensity doesn't necessarily correlate w/severity**
- Some **murmurs** best appreciated in certain **positions**:
Mitral: patient on **L side**; **Aortic**: **sitting** up and leaning **forward**
- Example – **Mitral Regurgitation**: Holosystolic, loudest in mitral area, radiates towards axilla.

[UCLA Heart Sound Simulator](http://www.wilkes.med.ucla.edu/) (<http://www.wilkes.med.ucla.edu/>)

[Blaufuss Medical - On Line Tutorial](http://www.blaufuss.org/) (<http://www.blaufuss.org/>)

Extra Heart Sounds – S3 & S4

- **Ventricular** sounds, occur during diastole
 - normal in young patient ($\sim < 30$ yo)
 - usually LV, rarely RV
- **S3 → follows S2**
 - caused by blood from LA colliding w/”left over” blood in LV
 - assoc w/heart failure.

EXTRA HEART SOUNDS - S3



- **S4 → precedes S1** –
 - caused during atrial systole
 - when blood squeezed into non-compliant LV
 - assoc w/HTN

EXTRA HEART SOUNDS - S4





Extra Heart Sound (cont)

- **S3 & S4** are **soft, low pitched**
[Blaufuss Medical - On Line Tutorial](http://www.blaufuss.org/)
(<http://www.blaufuss.org/>)
- Best heart w/**bell**, laid **over LV**, w/patient lying on **L side** (brings apex of heart closer to chest wall) – can also check over **RV** (4th ICS, L parasternal)
- Abnormal beyond age ~30
- When present, **S3 or S4** are referred to as “**gallops**”
[Ohio State University School of Medicine Interactive Learning Center – Heart Sounds – Simulated S3 & S4](#)

Auscultation – An Ordered Approach

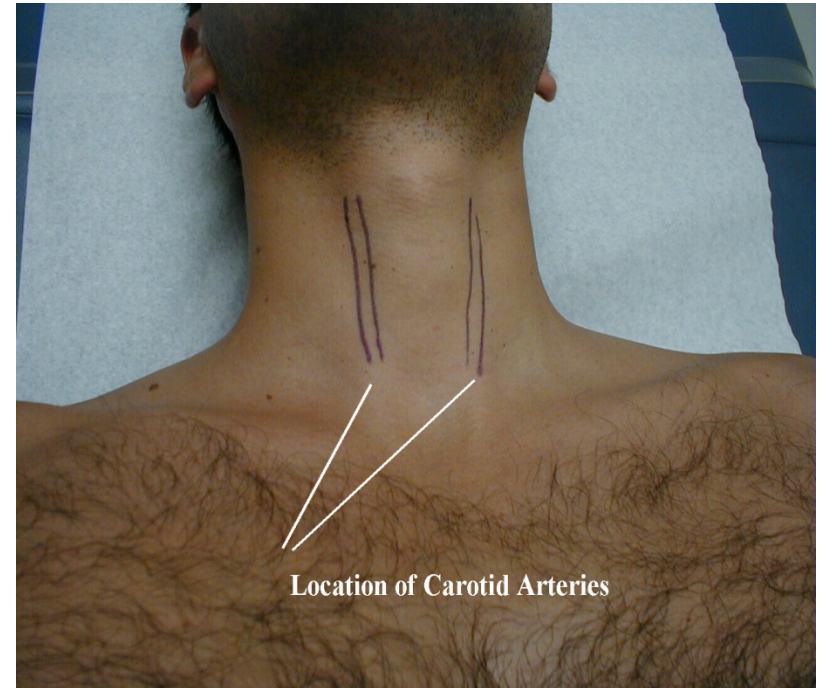


- Do I hear **S1**? Do I hear **S2**?
 - Listen in **ea major valvular** area – think about which sound should be loudest in ea location (S1 loudest region of TV & MV, S2 loudest AV & PV)
- Do I hear **physiologic splitting** of **S2**?
- Do I hear something before S1 (an **S4**) or after S2 (an **S3**)?
- Do I hear **murmur** in **systole**? In **diastole**?
- **If a murmur** present, note:
 - **intensity, character, duration, radiation**
- As **listen**, **think** about **mechanical events** that generate the sounds.



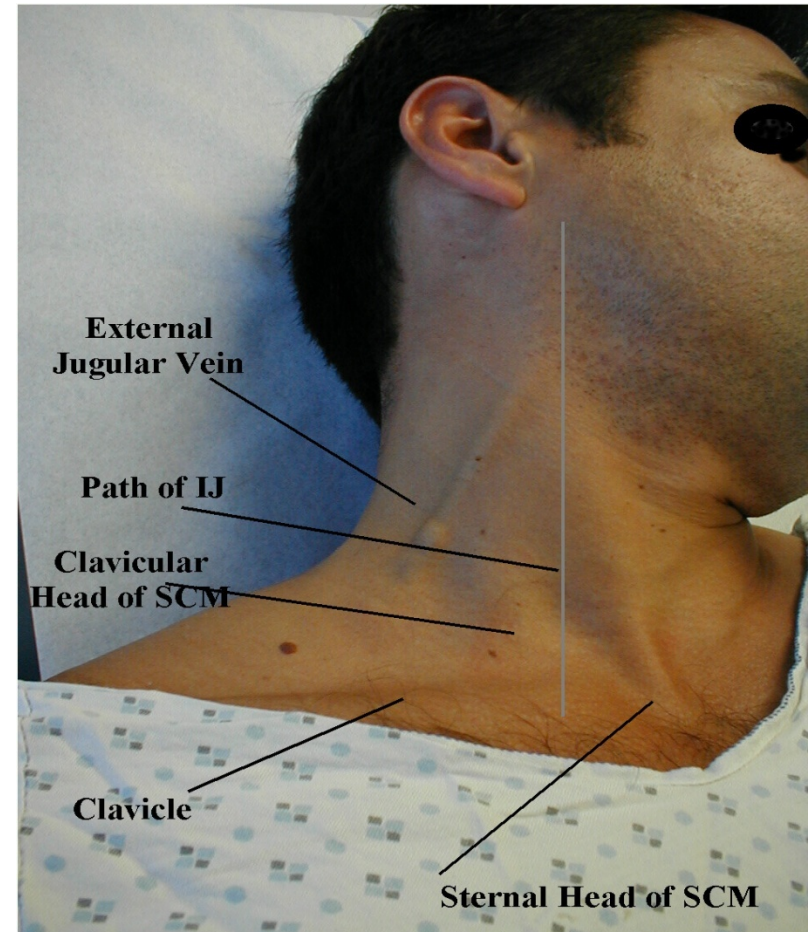
Carotid Arteries

- **Anatomy**
- **Palpation** (ea side separately!)
 - Rhythm
 - Fullness
- **Auscultation**
 - **Radiation** of murmurs
 - ? **Intrinsic atherosclerosis** – may produce “shshing” noise known as bruit



Jugular Venous Pressure (JVP)

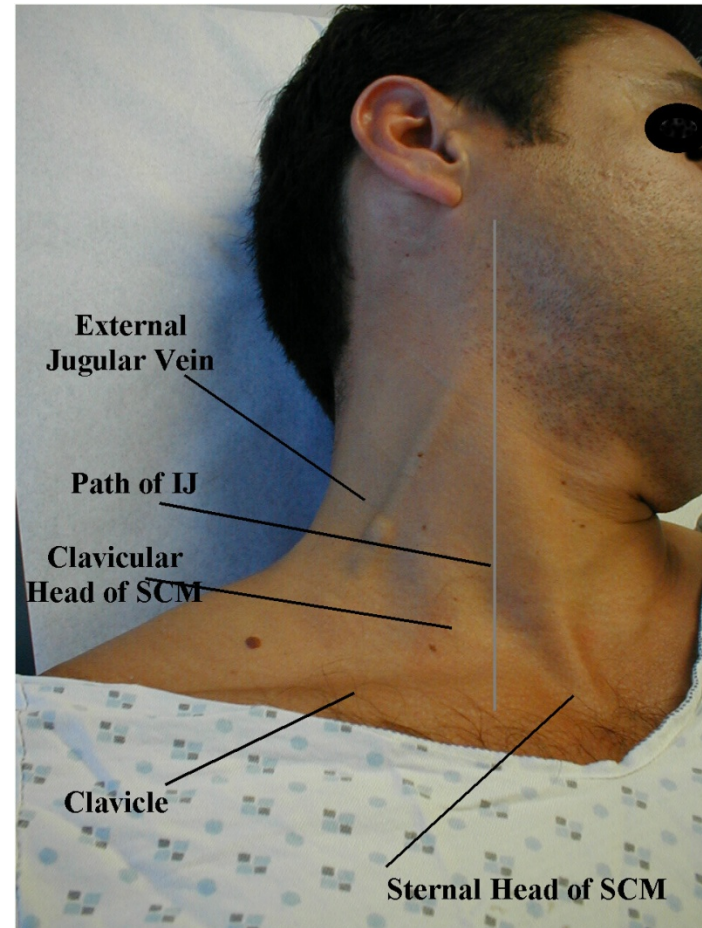
- **Anatomy** of Internal Jugular Vein
- Straight **line** with **RA**
- **Manometer**→ reflecting Central Venous Pressure (**CVP**)



JVP Technique



- **Find correct area** – helps to first identify SCM & triangle it forms w/clavicle
- Look for **multi-phasic pulsations** ('a', 'c' & 'v' waves)
- **Isolate** from **carotid** pulsations, **respirations**
- Tangential **lighting**
- **Hepatojugular reflux** (gentle pressure over liver pushes blood back into IJ & makes pulsations more apparent)

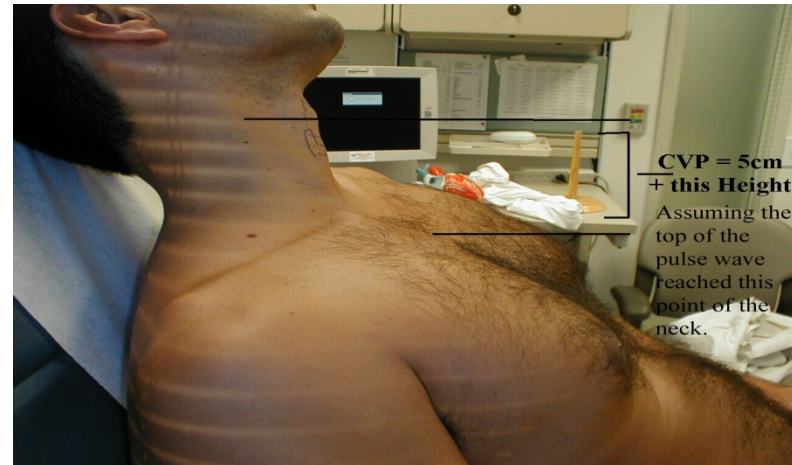


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JVP Technique (cont)



- **JVP = s 5cm** (height sternal-manubrial angle is above RA) + **vertical distance from sternal-manubrial angle to top of pulse wave**



[Assessing JVP - Anatomic and other Considerations](http://www.cuhk.edu)

(<http://www.cuhk.edu>)

Summary Of Skills



- ☐ Wash hands
- ☐ Inspect precordium
- ☐ Palpation of RV and LV; Determination PMI
- Auscultation
 - ☐ S1 and S2 in 4 valvular areas w/diaphragm
 - ☐ Try to identify physiologic splitting S2
 - ☐? Murmurs
 - ☐ Assess for extra heart sounds (S3, S4) w/bell over LV
- ☐ Carotid artery palpation, auscultation
- ☐ Jugular venous pressure assessment

Time Target: < 10 min